Algebra 2 Honors
Exponents Test Review

Simplify the expression. Remember, no negative exponents should be remaining.

1. $\left(x^7 y^{-8} z^{\frac{1}{2}}\right)^4$

$\boxed{\dfrac{x^{28} z^{2}}{y^{32}}}$

2. $\left(\dfrac{a^m b^{-3}}{c^{-6} d}\right)^{10}$

$\boxed{\dfrac{a^{10m} c^{60}}{b^{30} d^{10}}}$

3. $\left(y^4 \bullet y^k\right)^m$

$\boxed{y^{4m+km} \text{ or } y^{m(4+k)}}$

4. $\left(\dfrac{z^2}{z^{-7}}\right)^{-5}$

$\dfrac{z^{-10}}{z^{35}} = \boxed{\dfrac{1}{z^{45}}}$

5. $\left(\dfrac{7^8}{7^x}\right)^{-2}$

$\boxed{\dfrac{7^{2x}}{7^{16}}}$

6. $\left(\dfrac{5^y}{13^x}\right)^{-6}$

$\boxed{\dfrac{13^{6x}}{5^{6y}}}$

Without graphing, identify if the following functions represent exponential **growth** or **decay**. **EXPLAIN** how you know.

5. $f(x) = 0.4^x$

decay
$0 < b < 1$

6. $f(x) = 6.7^x$

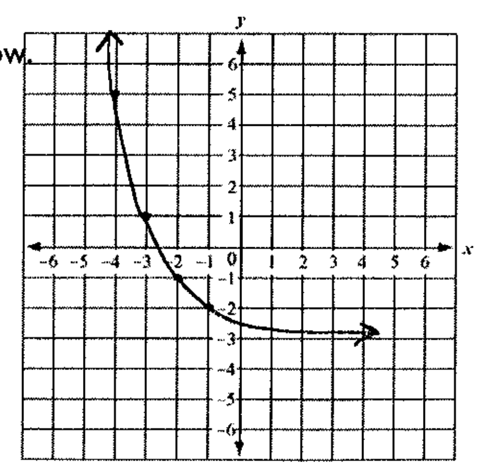
growth
$b > 1$

7. $f(x) = \left(\dfrac{3}{2}\right)^x$

growth
$b > 1$

8. Complete the table for $f(x) = \left(\dfrac{1}{2}\right)^{x+1} - 3$. Then sketch the function below.

x	f(x)
-2	-1
-1	-2
0	$-2\frac{1}{2}$
1	$-2\frac{3}{4}$
2	$-2\frac{7}{8}$



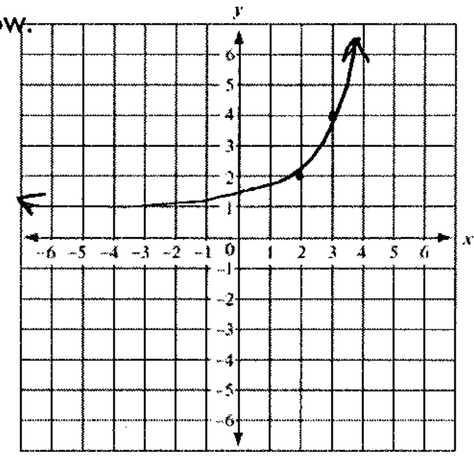
9. What is the domain and range of the function $f(x)=\left(\frac{1}{2}\right)^{x+1}-3$?

D: $(-\infty, \infty)$

R: $(-3, \infty)$

10. Complete the table for $f(x)=(3)^{x-2}+1$. Then sketch the function below.

x	f(x)
-2	$1\frac{1}{81}$
-1	$1\frac{1}{27}$
0	$1\frac{1}{9}$
1	$1\frac{1}{3}$
2	2



11. What is the domain and range of the function $f(x)=(3)^{x-2}+1$?

D: $(-\infty, \infty)$

R: $(1, \infty)$

12. Compare the graph of the parent function, $f(x)=2^x$, to the graph of $g(x)=2^{x+1}-6$. Describe how the graph has shifted.

It shifted left 1 unit & down 6 units.

13. Compare the graph of the parent function, $f(x)=\left(\frac{1}{2}\right)^x$, to the graph of $g(x)=\left(\frac{1}{2}\right)^{x-7}+2$. Describe how the graph has shifted.

It shifted right 7 units & up 2 units.

14. Rewrite the equation $f(x)=5(2)^{x+1}-3$ in a simpler form so that it is represented by only two transformations of $y=2^x$.

$f(x)=5(2^x)(2^1)-3$

$\boxed{f(x)=10(2^x)-3}$

15. Rewrite the equation $f(x)=50(5)^{x-2}-3$ in a simpler form so that it is represented by only two transformations of $y=5^x$.

$f(x)=\frac{50(5^x)}{5^2}-3$

$\boxed{f(x)=2(5^x)-3}$

16. Look for a pattern in each data set. Which kind of model best describes each data?

Weather in Phoenix, AZ	
Time (hours)	**Temperature**
0	63
1	66
2	69
3	72
4	75

a. cubic
b. exponential
c. quadratic
d. linear

Population of Phoenix, AZ	
Years	**Temperature**
	1001 +9
1	1010 +90 +10
2	1100 +900 +10
3	2000 +9000 +10
4	11000 +90,000
5	101000

a. cubic
b. exponential
c. quadratic
d. linear

Area of a square	
Side length	**area**
0	0
1	1
2	4
3	9
4	16

a. cubic
b. exponential
c. quadratic
d. linear

17. Write a function that describes each data set.

Weather in Phoenix, AZ	
Hours (h)	**Temperature (t)**
0	63
1	66
2	69
3	72
4	75

$f(x) = 3x + 63$

Population of Phoenix, AZ	
Years (y)	**# of People (p)**
1	1010
2	1100
3	2000
4	11000
5	101000

Area of a square	
Side length (s)	**Area (A)**
0	0
1	1
2	4
3	9
4	16

$f(x) = x^2$

18. Circle all the ordered pairs that satisfy an exponential function.

x	0	1	2	3
y	0	1	32	243

x	0	1	2	3
y	1	3	9	27

x	0	1	2	3
y	6	7	9	13

x	0	1	2	3
y	7	8	9	10

x	0	1	2	3
y	-1	2	5	8

x	0	1	2	3
y	0	1	4	9

x	0	1	2	3
y	1	5	25	125

x	0	1	2	3
y	1	0.25	.0625	.01563

7.

19. Camelback High School and Arcadia high school have had enrollment changes over the last ten years that follows exponential growth or exponential decay patterns.

Camelback: The student enrollment was 3,000 in 1990. It has **increased** in students by approximately 4.3% per year.
Arcadia: The student enrollment was 5,000 in 1990. It has experienced a **decrease** in students of 8.1% per year.

Part A: Write an exponential model to describe the enrollment at Camelback High School.

$f(C) = 3000(1.043)^C$

Part B: Estimate the enrollment for CBHS in the year 1993.

$f(3) = 3000(1.043)^3$

$\boxed{f(3) \approx 3404.}$

Part C: Write an exponential model to describe the enrollment of Arcadia High School.

$f(A) = 5000(.919)^A$

Part D: Estimate the student enrollment of Arcadia in the year 2005. Is this a good approximation? Explain why or why not. What about for the year 2015?

$f(15) = 5000(.919)^{15}$

$f(15) \approx 1408$

$f(25) = 5000(.919)^{25}$

$f(25) \approx 605$

While this estimate may be appropriate for 2005, the estimate assumes a significant decreased population. It is not appropriate for 2015. A high school of 600 students would b[illegible]

Part E: Which model represents exponential growth? Which is a model of exponential decay? Explain why exponential growth or exponential decay models can be used for this data.

$f(C)$ is growth because $b>1$.

$f(A)$ is decay because $0<b<1$.

Part F: Approximately how many years would it take the population at Camelback to double? Determine the solution using the table on your calculator.

$6000 = 3000(1.043)^x$

Between 16 & 17 yrs.

Part G: Write an equation that could be solved to determine when the two schools would have an equal student enrollment. (You DO NOT have to solve this! Just write the equation)

$3000(1.043)^x = 5000(.919)^x$

20. A scientist places 7.35 grams of a radioactive element in a dish. The half-life of the element is 2 days. After d days, the number of grams of the element remaining in the dish is given by the function $R(d) = 7.35(\frac{1}{2})^{d/2}$. Which statement is true about the equation when it is rewritten without a fractional exponent?

Choose **all** that apply.

a) An approximately equivalent equation is $R(d) = 7.35(0.250)^d$.
b) An approximately equivalent equation is $R(d) = 7.35(0.707)^d$.
c) The base of the exponent in this form of the equation can be interpreted to mean that the element decays by 0.250 grams per day.
d) The base of the exponent in this form of the equation can be interpreted to mean that the element decays by 0.707 grams per day.
e) The base of the exponent in this form of the equation can be interpreted to mean that about 25% of the element remains from one day to the next day.
f) The base of the exponent in this form of the equation can be interpreted to mean that about 70.7% of the element remains from one day to the next day.